Application Number 10/826,925
Amendment in response to Office Action mailed October 16, 2007

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claims 1-23 (Cancelled).

Claim 24 (Currently Amended):   A medical system comprising:

a medical device that delivers a therapy to a patient, and monitors at least one physiological parameter of the patient based on a signal received from at least one sensor; and

a processor that determines a value of a metric that is indicative of sleep quality based on values of the at least one physiological parameter, identifies determined during delivery of the therapy by the medical device according to a current therapy parameter set, and associates the sleep quality metric value with the current therapy parameter set; and

a memory that receives the sleep quality metric value and an indication of the therapy parameter set associated with the sleep quality metric value.

Claim 25 (Original):   The medical system of claim 24, wherein the medical device monitors at least one of activity level, posture, heart rate, respiration rate, respiratory volume, and core temperature.

Claim 26 (Original):   The medical system of claim 24, wherein the medical device monitors at least one of blood pressure, blood oxygen saturation, partial pressure of oxygen within blood, partial pressure of oxygen within cerebrospinal fluid, muscular activity, arterial blood flow, melatonin level within a bodily fluid, and galvanic skin response.

Claim 27 (Original):   The medical system of claim 24, wherein the sleep quality metric comprises sleep efficiency, and the processor identifies when the patient is attempting to sleep, identifies when the patient is asleep, and determines a percentage of time that the patient is asleep while the patient is attempting to sleep as the value of the sleep quality metric.

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Claim 28 (Original):   The medical system of claim 24, wherein the sleep quality metric comprises sleep latency, and the processor identifies a first time when the patient begins attempting to sleep, identifies a second time when the patient falls asleep, and determines an amount of time between the first and second times as the value of the sleep quality metric.

Claim 29 (Original):   The medical system of claim 24, wherein the processor identifies when the patient is asleep, and determines an amount of time that the patient is asleep during a period as the value of the sleep quality metric.

Claim 30 (Original):   The medical system of claim 24, wherein the processor identifies when the patient is asleep, and identifies at least one of a number of arousal events and a number of apnea events during a period of sleep as the value of the sleep quality metric.

Claim 31 (Original):   The medical system of claim 24, wherein the processor identifies when the patient is within a sleep state, and determines an amount of time that the patient was within the sleep state.

Claim 32 (Original):   The medical device of claim 31, wherein the sleep state comprises at least one of an S3 sleep state and an S4 sleep state.

Claim 33 (Original):   The medical system of claim 24, wherein the processor determines a value of each of a plurality of sleep quality metrics, and determines a value of an overall sleep quality metric based on the plurality of sleep quality metric values.

Claim 34 (Original):   The medical system of claim 33, wherein the processor applies a weighting factor to at least one of the plurality of sleep quality metric values to determine the value of the overall sleep quality metric.

Claim 35 (Original):   The medical system of claim 24, further comprising a programming device to present sleep quality information to a user based on the sleep quality metric values determined by the processor.

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Claim 36 (Original): The medical system of claim 35, wherein the user comprises a clinician, and the programming device comprises a clinician programmer that presents at least one of a trend diagram, a histogram and a pie chart to the clinician based on the sleep quality metric values.

Claim 37 (Original): The medical system of claim 35, wherein the user comprises a patient, and the programming device comprises a patient programmer that presents a message related to sleep quality to the patient based on the sleep quality metric values.

Claim 38 (Currently Amended): The medical system of claim 24,
 wherein the processor determines a plurality of values of the sleep quality metric over time, each of the values of the sleep quality metric determined based on values of the at least one physiological parameter that were determined during delivery of the therapy according to at least one of a plurality of therapy parameter sets, and associates each of the determined values of the sleep quality metric with a current the at least one of the plurality of therapy parameter sets, and
 wherein, for each of a the plurality of therapy parameter sets, the processor determines a representative value of the sleep quality metric based on the values of the sleep quality metric associated with the therapy parameter set.

Claim 39 (Original): The medical system of claim 38, wherein the representative value for each therapy parameter set comprises one of a mean value and a median value.

Claim 40 (Original): The medical system of claim 38, further comprising a programming device that presents a list of the therapy parameter sets and the associated representative values to a user, and orders the list of therapy parameter sets according to the associated representative values.

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Claim 41 (Currently Amended):   The medical system of claim 38,

wherein the processor determines a plurality of values over time for each of a plurality of metrics that are indicative of sleep quality, each of the values of each of the sleep quality metrics determined based on values of the at least one physiological parameter that were determined during delivery of the therapy according to at least one of a plurality of therapy parameter sets, and associates each of the determined values with a current the at least one of the plurality of therapy parameter sets, and

wherein, for each of the plurality of therapy parameter sets, the processor determines a representative value for each of the sleep quality metrics based on the values of that sleep quality metric associated with the therapy parameter set.

Claim 42 (Original): The medical system of claim 41, further comprising a programming device that presents a list of the therapy parameter sets and the associated representative values to a user, and orders the list of therapy parameter sets according to the representative values of a user-selected one of the sleep quality metrics.

Claim 43 (Original): The medical system of claim 24, wherein the processor comprises a processor of the medical device.

Claim 44 (Withdrawn):   The medical system of claim 24, further comprising a programming device, wherein the processor comprises a processor of the programming device.

Claim 45 (Original): The medical system of claim 24, wherein the medical device comprises an implantable medical device.

Claim 46 (Original): The medical system of claim 45, wherein the implantable medical device comprises at least one of an implantable neurostimulator and an implantable drug pump.

Claim 47 (Original): The medical system of claim 24, wherein the medical device comprises at least one of a trial neurostimulator and a trial pump.

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Claim 48 (Original):   A medical system comprising:

means for monitoring at least one physiological parameter of a patient;

means for determining a value of a metric that is indicative of sleep quality based on the at least one physiological parameter;

means for identifying a current therapy parameter set used by a medical device to delivery therapy to the patient; and

means for associating the sleep quality metric value with the current therapy parameter set.

Claim 49 (Original):   The medical system of claim 48, wherein means for determining a sleep quality metric value comprises means for determining a plurality of values of the sleep quality metric over time, the system further comprising means for presenting sleep quality information to a user based on the plurality of values.

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Claim 50 (Original):   The medical system of claim 48,

wherein means for determining a sleep quality metric value comprises means for determining a plurality of values of the sleep quality metric over time, and means for associating the sleep quality metric value with the current therapy parameter set comprises means for associating each of the determined values of the sleep quality metric with a current therapy parameter set,

the system further comprising:

means for determining a representative value of the sleep quality metric for each of a plurality of therapy parameter sets based on the values of the sleep quality metric associated with the therapy parameter set;

means for presenting a list of the therapy parameter sets and the associated representative values to a user; and

means for ordering the list of therapy parameter sets according to the associated representative values.

Claim 51 (Currently Amended):   A medical system comprising:

an implantable medical device that delivers a therapy to a patient, monitors at least one physiological parameter of the patient, and determines a plurality of values of a metric that is indicative of sleep quality based on values of the at least one physiological parameter, and associates each of the sleep quality metric values with at least one of a plurality of therapy parameter sets that was used by the medical device to deliver the therapy to the patient when the values of the at least one physiological parameter were determined; and

an external programming device including a display that receives sleep quality metric values and indications of therapy parameter sets with which the sleep quality metric values are associated from the implantable medical device, and presents sleep quality information to a user via the display based on the sleep quality metric values and the indications.

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Claim 52 (Original):   The medical system of claim 51,

wherein the user comprises a clinician and the programming device comprises a clinician programmer, and

wherein the programming device presents a graphical representation of the sleep quality metric values via the display.

Claim 53 (Original):   The medical system of claim 52, wherein the programming device presents at least one of a trend diagram, a histogram and a pie chart via the display based on the sleep quality metric values.

Claim 54 (Original):   The medical system of claim 51,

wherein the user comprises a patient and the programming device comprises a patient programmer, and

wherein the programming device presents a message related to sleep quality to the patient based on the sleep quality metric values.

Claim 55 (Currently Amended):   The medical system of claim 51,

wherein the implantable medical device ~~associates each determined sleep quality metric value with a current therapy parameter set, and~~ determines a representative value for the sleep quality metric for each of a ~~a~~ the plurality of therapy parameter sets based on the values of the sleep quality metric associated with the therapy parameter sets, and

wherein the programming device ~~receives information identifying the plurality of therapy parameter sets and the sleep quality metric values associated with the therapy parameter sets from the implantable medical device, presents a list of the therapy parameter sets and the associated sleep quality metric values to a user, and~~ orders the list of therapy parameter sets according to the associated representative sleep quality metric values.

Claim 56 (Original):   The medical system of claim 51, wherein the implantable medical device comprises at least one of an implantable neurostimulator and an implantable drug pump.

Claims 57-82 (Cancelled).

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· Claim 83 (Currently Amended):   A medical system comprising:

a medical device that delivers a therapy to a patient;

a plurality of sensors, each of the sensors generating a signal as a function of at least one physiological parameter of a patient; and

a processor that monitors the signals generated by the sensors, identifies when the patient is attempting to sleep, identifies when the patient is asleep based on at least one of the signals, and determines a value of a metric that is indicative of sleep quality based on the identifications of when the patient is attempting to sleep and when the patient is asleep, and associates the sleep quality metric value with a therapy parameter set used by the medical device to deliver the therapy to the patient when at least one of when the patient is attempting to sleep and when the patient is asleep was identified.

Claim 84 (Original):   The medical system of claim 83, wherein the processor receives an indication from the patient that the patient is attempting to sleep.

Claim 85 (Original):   The medical system of claim 83, wherein the processor monitors posture of the patient based on at least one of the signals, and identifies when the patient is attempting to sleep by identifying when the patient is recumbent.

Claim 86 (Original):   The medical system of claim 85, wherein the plurality of sensors includes a plurality of orthogonally aligned accelerometers, and the processor identifies when the patient is recumbent based on a DC component of each of the signals.

Claim 87 (Original):   The medical system of claim 83, wherein the processor monitors at least one signal that varies as a function of activity of the patient, and identifies when the patient is attempting to sleep based on an activity level of the patient.

Claim 88 (Original):   The medical device of claim 83, wherein the processor monitors a signal that varies as a function of a level of melatonin within a bodily fluid of the patient, and identifies when the patient is attempting to sleep based the melatonin level.

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Claim 89 (Original): The medical system of claim 83, wherein the processor identifies when the patient is asleep based on at least one of activity level, heart rate, respiration rate, respiratory volume, and core temperature.

Claim 90 (Original): The medical system of claim 83, wherein the processor identifies when the patient is asleep based on at least one of blood pressure, blood oxygen saturation, partial pressure of oxygen within blood, partial pressure of oxygen within cerebrospinal fluid, muscular activity, arterial blood flow, and galvanic skin response.

Claim 91 (Original): The medical system of claim 83, wherein the sleep quality metric comprises sleep efficiency, and the processor determines a percentage of time that the patient is asleep while the patient is attempting to sleep as the value of the sleep quality metric.

Claim 92 (Original): The medical system of claim 83, wherein the sleep quality metric comprises sleep latency, and the processor identifies a first time when the patient begins attempting to sleep, identifies a second time when the patient falls asleep, and determines an amount of time between the first and second times as the value of the sleep quality metric.

Claim 93 (Original): The medical system of claim 83, further comprising a programming device that presents sleep quality information to a user based on the sleep quality metric values.

Claim 94 (Currently Amended):   The medical system of claim 93, wherein the user comprises a clinician, and the programming device comprises a clinician programmer that presents a graphical representation of the sleep quality metric ~~values~~ values.

Claim 95 (Original): The medical system of claim 94, wherein the programming device presents at least one of a trend diagram, a histogram and a pie chart to the clinician based on the sleep quality metric values.

Claim 96 (Original): The medical system of claim 93, wherein the user comprises a patient, and the programming device comprises a patient programmer that presents a message related to sleep quality to the patient based on the sleep quality metric values.

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Claim 97 (Original):   The medical system of claim 83, further comprising a medical device, wherein the processor comprises a processor of the medical device.

Claim 98 (Original):   The medical system of claim 97, wherein the medical device comprises an implantable medical device.

Claim 99 (Withdrawn):   The medical system of claim 83, further comprising a programming device, wherein the processor comprises a processor of the programming device.

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